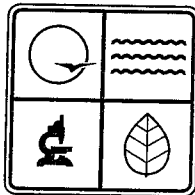


STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI AIR CONSERVATION COMMISSION



PERMIT BOOK

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: **092006-004** Project Number: **2006-06-026**

Owner: **Associated Electric Cooperative, Inc.**

Owner's Address: **P.O. Box 754, Springfield, MO 65801-0754**

Installation Name: **New Madrid Power Plant**

Installation Address: **St. Jude Road, Marston, MO 63866**

Location Information: **New Madrid County, S22N, T29, R14E**

Application for Authority to Construct was made for:

Installation of Over-Fire Air (OFA) combustion controls on Units 1 and 2. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, Construction Permits Required.

☐ Standard Conditions (on reverse) are applicable to this permit.

☒ ~~Standard Conditions~~ (on reverse) and Special Conditions (listed as attachments starting on page 2) are applicable to this permit.

SEP 18 2006

EFFECTIVE DATE


DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional Office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed Special Conditions as provided in RSMo 643.075. If you choose to appeal, the Air Pollution Control Program must receive your written declaration within 30 days of receipt of this permit.

If you choose not to appeal, this certificate, the project review, your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Department of Natural Resources has established the Outreach and Assistance Center to help in completing future applications or fielding complaints about the permitting process. You are invited to contact them at 1-800-361-4827 or (573) 526-6627, or in writing addressed to Outreach and Assistance Center, P.O. Box 176, Jefferson City, MO 65102-0176.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention Construction Permit Unit.

2006-06-026

Associated Electric Cooperative, Inc.

P.O. Box 754, Springfield, MO 65801-0754

New Madrid Power Plant

St. Jude Road, Marston, MO 63866

New Madrid County, S22N, T29, R14E

Installation of Over-Fire Air (OFA) combustion controls on Units 1 and 2. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

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Permit No.	
Project No.	2006-06-026

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

New Madrid Power Plant
New Madrid County, S22N, T29, R14E

1. Standards of Performance for Best Available Control Technology (BACT) for Carbon Monoxide (CO)
 - A. New Madrid Power Plant shall not emit more than 0.55 pounds of CO per million British Thermal Units (lb/MMBTU) of heat input each from Unit 1 and Unit 2 based on a 30-day rolling average. This limit is exclusive of emissions occurring during start-up, shutdown and malfunction.
 - B. New Madrid Power Plant shall not emit more than 34,449 tons per year of CO combined from Unit 1 and Unit 2. This limit is inclusive of emissions during start-up, shutdown and malfunction.
 - C. New Madrid Power Plant shall operate continuous CO emission monitors to measure, record and report CO emissions compliance.
2. Continuous Emission Monitoring System (CEMS) – Unit 1 and Unit 2
 - A. New Madrid Power Plant shall install, certify, operate, calibrate, test and maintain CEMS for CO and any necessary auxiliary monitoring equipment in accordance with all applicable regulations. If there are conflicting regulatory requirements, the more stringent shall apply.
 - B. CEMS certification shall be made pursuant to 40 CFR Part 60, Appendix B, Performance Specification 4.
 - C. Periodic quality assurance assessments shall be conducted according to the procedures outlined in 40 CFR Part 60, Appendix F.
 - D. New Madrid Power Plant shall install and operate a data acquisition and handling system to calculate emissions in terms of the emission limitations specified in this permit.

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Permit No.	
Project No.	2006-06-026

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

3. Record Retention Requirements
New Madrid Power Plant shall maintain all records required by this permit, on-site, for the most recent 60 months of operation and shall make such records available immediately to any Missouri Department of Natural Resources' personnel upon request.
4. Reporting Requirements
New Madrid Power Plant shall report CO emissions in their current semi-annual monitoring (SAM) report and in the annual compliance certification (ACC).

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (8) REVIEW

Project Number: 2006-06-026
Installation ID Number: 143-0004
Permit Number:

New Madrid Power Plant
St. Jude Road
Marston, MO 63866

Complete: June 5, 2006

Parent Company:
Associated Electric Cooperative, Inc.
P.O. Box 754
Springfield, MO 65801-0754

New Madrid County, S22N, T29, R14E

REVIEW SUMMARY

- New Madrid Power Plant has applied for authority to construct Over-Fire Air (OFA) combustion controls on Units 1 and 2 to reduce nitrogen oxide (NO_x) emissions.
- Hazardous Air Pollutant (HAP) emissions are not expected from the proposed equipment.
- None of the New Source Performance Standards (NSPS) apply to the proposed equipment.
- None of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) or currently promulgated Maximum Achievable Control Technology (MACT) regulations apply to the proposed equipment.
- The Best Available Control Technology (BACT) requirements apply to the proposed equipment. Good combustion practices will control carbon monoxide (CO) emissions to a level of 0.55 lb/MMBTU on a 30-day rolling average.
- This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of CO are above the major source threshold.
- This installation is located in New Madrid County, an attainment area for all criteria air pollutants.
- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2, Number 26 – *Fossil-fuel fired steam electric plants of more than 250 million British thermal units per hour heat input*]. Therefore, the major source threshold for all criteria pollutants is 100 tons per year.

- Ambient air quality modeling was performed to determine the ambient impact of CO.
- Emissions testing is not required for the source.
- Revision to the Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

New Madrid Power Plant includes two 615-megawatt (MW) gross (7,150 MMBTU/hr maximum heat input, based on 2001-2005 CEMs data) baseload coal-fired cyclone burner steam electric generating units – Unit 1 and Unit 2. The units utilize Powder River Basin (PRB) coal. Both units currently control particulate matter emissions using an electrostatic precipitator, while selective catalytic reduction (SCR) is utilized during ozone season (May through September) to control NO_x emissions.

The installation is a major source for both construction and operating permits. New Madrid Power Plant is considered a Part 70 source by operating permits and was issued Permit No. OP2001-003 in January 2001. The permit renewal (Project No. 2005-07-101) is currently under review.

The following construction permits have been issued to New Madrid Power Plant from the Air Pollution Control Program.

Table 1: Previously Issued Construction Permits

Permit Number	Description
1292-014	Switch from high sulfur to low sulfur coal
122002-013	Eight (8) 300 hp diesel-fired cooling water pumps
052006-001	Two (2) 345 horsepower (hp) diesel water pumps

PROJECT DESCRIPTION

New Madrid Power Plant proposes to install OFA combustion controls on both units in order to control NO_x emissions. NO_x reduction is achieved by limiting the amount of free oxygen that can combine with nitrogen by staging combustion from the cyclone boiler barrels. NO_x emissions are expected to decrease by at least 50% (a reduction of around 0.66 lb/MMBTU), or by almost 15,000 tons per year. Collateral CO emissions are expected from utilizing OFA combustion controls. This generation takes place primarily in the lower furnace. Further combustion takes place while combustion air resides in the boiler, thereby reducing CO concentrations in the upper furnace. According to the applicant, in cyclone furnace applications, the concentration of CO in the upper furnace is unchanged or slightly higher than CO concentrations prior to OFA installation.

In determining Prevention of Significant Deterioration (PSD) applicability, a comparison of future potential emissions was made with past actual emissions. The resultant difference exceeded the major source threshold, making the project subject to PSD review. Past actual emissions were calculated using the Environmental Protection Agency's Factor Information Retrieval (FIRE) Data System emission factor of 0.5 lb CO/ton coal. Since there has been no site-specific CO testing conducted, actual emissions could vary from this value. In fact, the past actual to future potential emissions could be less than the significance threshold. Electric utilities are allowed to use a less conservative past actual to future actual calculation methodology, but the applicant would then be required to track post-project emissions for a period of 5 years following the project. However, New Madrid Plant has decided to pursue the more conservative option of utilizing the past actual to future potential methodology, causing them to undergo PSD review.

Past OFA projects like this were considered pollution control projects (PCP) as defined in 40 CFR 52.21 (b)(32)(iii) because it is the installation of pollution control equipment to reduce emissions of one pollutant while increasing emissions of another pollutant, and were exempt from PSD permitting. The PCP exemption was based on a determination that the environmental benefit from an emission reduction outweighs the environmental detriment of any emission increases. Any collateral increase in emissions could not cause a violation of the applicable National Ambient Air Quality Standard. However, the Washington DC Circuit Court has vacated the PCP provisions. Now, any pollution control device that results in collateral emissions increase of a regulated pollutant must be permitted dependent on the magnitude of those collateral emissions.

EMISSIONS/CONTROLS EVALUATION

Collateral emissions of CO resulting from operation of the OFA combustion controls are the pollutant of concern. Potential emissions were determined based on an emission rate of 0.55 lb/MMBTU of CO from each of the boilers operating at 100% load. Heat input for each boiler was assumed to be 7,150 MMBTU/hr. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year). Existing potential emissions were taken from Permit No. 052006-001. Existing actual emissions were taken from the applicant's 2005 Emissions Inventory Questionnaire (EIQ) submittal. The following table provides an emissions summary for this project.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2005 EIQ)	Net Increase in Emissions
PM ₁₀	15.0	776	388	N/A
SO _x	40.0	23,357	13,701	N/A
NO _x	40.0	54,107	31,837	Decrease
VOC	40.0	278	230	N/A
CO	100.0	1,224	1,043	33,371
HAPs	10.0/25.0	151	143	N/A

*N/A = Not Applicable

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of CO are above the major source threshold.

APPLICABLE REQUIREMENTS

New Madrid Power Plant shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required June 1 for the previous year's emissions.
- *Operating Permits*, 10 CSR 10-6.065
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-3.090

SPECIFIC REQUIREMENTS

- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating*, 10 CSR 10-3.060
- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260

BACT ANALYSIS

Introduction

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a BACT analysis on any pollutant emitted in greater than de minimis levels. The BACT requirement is detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(B).

A BACT analysis is done on a case by case basis and is performed in general by using a “top-down” method. The following steps detail the top-down approach:

1. Identify all potential control technologies – must be a comprehensive list, it may include technology employed outside the United States and must include the Lowest Achievable Emission Rate (LAER) determinations.
2. Eliminate technically infeasible options – must be well documented and must preclude the successful use of the control option.
3. Rank remaining control technologies – based on control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, and economic impacts.
4. Evaluate the most effective controls – based on a case-by-case consideration of energy, environmental, and economic impacts.
Select BACT.

Potential CO Control Technologies

CO emissions can be controlled by either minimizing CO formation during combustion or by post-combustion oxidation systems to oxidize any CO formed in the combustion process.

- Combustion Controls
 - ✧ Good Combustion Practices
- Post-Combustion Controls
 - ✧ Catalytic Oxidation
 - ✧ Thermal Oxidation

Good combustion practices prevent formation of CO during combustion. A number of measures can be taken to ensure that CO generation is minimized, including: maintaining proper fuel-to-air-flow ratios; visually monitoring combustion conditions for excessive haze, ash agglomeration and bridging on boiler tubes; periodically checking coal mill performance for coal fineness; periodically measuring unburned carbon to determine how combustion can be optimized; determining proper control settings for optimum efficiency and minimal CO generation; and empirically determining optimal CO emission rates and NO_x emission reduction during unit testing and tuning.

Catalytic oxidation requires oxygen, minimal heat and a catalyst to convert CO to CO₂. Catalytic oxidation is widely used in the refinery industry and for gas turbines in the utility industry. However, the noble metal catalysts typically used are highly susceptible to poisoning from high sulfur compounds. High particulate loading can also cause rapid deactivation and fouling. Placement of the oxidation unit downstream from the particulate matter control device would make re-heating of the exhaust stream

necessary, increasing emissions of NO_x and PM₁₀ from combustion of additional fuel. The conditions necessary for CO conversion also favor the conversion of SO₂ → SO₃. The applicant states that as great as 50% conversion could occur. The SO₃ would combine with moisture in the flue gas, increasing sulfuric acid mist emissions from the stack. Catalytic oxidation is not employed on large coal fired boilers due to the reasons cited, is not commercially available and is thus, considered technically infeasible.

Thermal oxidation also uses heat and oxygen for the CO → CO₂ conversion, but without the use of a catalyst. Temperatures in excess of 1,500° F are required. As with the catalytic oxidation unit, to prevent fouling, the thermal oxidizer would need to be located downstream of the particulate matter control device. Heat exchangers and a natural gas furnace would be needed to raise the temperature from approximately 292°F to the required temperature. Additional NO_x and PM₁₀ emissions would result. The same problems exist for thermal oxidation as for catalytic oxidation. There are no post-combustion controls in use on coal-fired boilers at this time; their use has historically been for the control of volatile organic compounds. Thermal oxidation is not considered to be technically feasible in this case.

BACT for CO

Good combustion practices are the only technically feasible alternative for minimizing CO emissions. A level of 0.55 lb/MMBTU heat input is chosen as the BACT limit (exclusive of start-up, shutdown and malfunction) on a 30-day rolling average. New Madrid Plant shall utilize CEMS to monitor the CO emissions from Units 1 and 2. In addition to the lb/MMBTU emissions limit, an annual CO emissions limit of 34,449 tons on a 12-month rolling basis will include start-up, shutdown and malfunction.

AMBIENT AIR QUALITY IMPACT ANALYSIS

An Ambient Air Quality Impact Analysis (AAQIA) must be completed for any air contaminant that exceeds the de minimis emission levels outlined in 10 CSR 10-6.020 (3)(A) Table 1. The AAQIA determines the ambient impact of emissions at or beyond the property boundary of the installation. New Madrid Power Plant conducted air dispersion modeling using the latest version of the SCREEN3 model (Version 96043). Additional impacts on visibility, growth, soils, plants and animals were also evaluated within the Class II area surrounding the facility.

PSD Increment is the maximum allowable increase in ambient concentrations of specific pollutants from all sources in a baseline area after the minor source baseline date. Only those pollutants and the associated averaging times that exceed the PSD significance level are reviewed for increment consumption. There is no increment level for CO and therefore, CO was not evaluated.

The screening analysis was conducted to determine if New Madrid Plant would be required to perform preconstruction monitoring, additional air quality modeling, or if the installation could forego further analysis altogether. If the preliminary analysis indicates that the facility will not significantly impact the air quality within a region, no further analysis is required. In addition to providing an indication of whether CO must undergo

a full impact analysis, the results of the preliminary analysis determine what, if any, preconstruction monitoring will be required. If the preliminary analysis indicates that the facility will not exceed the monitoring significance level, no preconstruction monitoring is necessary.

Since the emission rate is expected to increase at 70% load, those results were utilized in the analysis. Table 3 summarizes the results of the preliminary analysis. No further modeling or preconstruction monitoring is required for CO based on the results of the preliminary analysis.

Table 3: Significance Levels for Modeling and Preconstruction Monitoring ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Period	Modeling Significance Level	Preliminary Analysis Results	Additional Modeling?	Pre-construction Monitoring Required?
CO	1-hour	2000	687.45	No	No
	8-hour	500	481.21		

Visibility

Visibility is a function of particulate and NO_x emissions. Since CO is the only pollutant that is increasing, no visibility impairment is expected. The reduction in NO_x will serve to improve the visibility impacts.

Growth

The building phase of the project is expected to temporarily increase the installation's workforce due to construction labor. The proposed modification will not require significant increases in the population.

Soils, Vegetation and Wildlife

Carbon monoxide is not known to injure plants. CO is not expected to have an adverse impact on threatened and endangered species.

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Lina Klein, P.E.
Environmental Engineer

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated June 2, 2006, received June 5, 2006, designating Associated Electric Cooperative, Inc. as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Southeast Regional Office Site Survey, dated June 21, 2006.

**Comments and Responses on Associated Electric Cooperative,
Inc. – New Madrid Power Plant's
Prevention of Significant Deterioration (PSD) New Source
Review Permit
Project Number 2006-06-026**

This document responds to comments made to the PSD draft permit. Comments have been summarized or paraphrased for the sake of clarity. The numbers of Special Conditions in the comments may have changed. The numbers referenced in the response reflect the final Special Condition numbering.

The following comments were submitted to the Air Pollution Control Program by the Environmental Protection Agency (EPA), Region VII in a letter dated August 31, 2006:

Comment: CO BACT Limit

"The permit application proposes a CO best available technology (BACT) limit of 0.70 lb/mmBtu. Following review of the application, Missouri Department of Natural Resources (MDNR) proposes in Condition 1 of the draft permit to lower the CO BACT limit to 0.55 lb/mmBtu, 30-day rolling average. While we agree that the record clearly establishes that "combustion control" is the appropriate technology for BACT, we believe that the record is unclear with respect to the BACT limit itself.

A number of similar Prevention of Significant Deterioration (PSD) permit for NO_x retrofit projects establish limits well below those in the Associated Electric Cooperative, Inc. (AECI) permit. Therefore, it is appropriate to provide an explanation in the record on what factors make the New Madrid units unique and why they are incapable of achieving these lower levels. For example, at Jeffrey Unit 3, the Kansas Department of Health and Environment set a CO BACT limit of 0.25 lb/mmBtu in its October '05 PSD permit <see http://www.epa.gov/region07/programs/artd/air/nsr/archives/2005/finalpermits/westar_jeffrey_pcp_final_psd_permit.pdf>. Likewise, the Iowa Department of Natural Resources has established CO BACT limits for LNB and OFA retrofits in the 0.385 to 0.42 range and as high as 1.27 lb/mmBtu for earlier pollution control projects. As you note in the permit summary for the New Madrid permit, Nebraska is currently evaluating a similar project and has proposed CO BACT at 0.50 lb/mmBtu. While these projects represent a significant range of emissions, and may indeed reflect the individual characteristics of each boiler, the New Madrid record does not appear to provide any distinguishing factors that would argue for the higher CO BACT limit; or even the lower limit ultimately established by the department.

We understand that the cyclone design at New Madrid may well have an influence on CO emissions, as it does with NO_x, and may have inherently higher emissions. This would be an appropriate factor to consider in the record. Likewise, the New Madrid units have been retrofitted with selective catalytic reduction (SCR) devices to minimize NO_x and these too may have an impact on CO emissions. Therefore, we recommend that the department supplement the record with additional analysis that explains why the New Madrid units are incapable of meeting 0.45, 0.40, 0.35 or some lower threshold for CO. Any engineering analysis, vendor studies, or other information from similar retrofit units would be a useful supplement to the record."

MDNR's Response:

The department agrees that the record needs enhancement with regard to the reasoning behind the establishment of the CO BACT emission limit level. During review of the permit application, the permitting agencies responsible for each permit found in the RBLC Database were contacted. Two units in Iowa have been permitted: the Mid-American George Neal Energy South unit at 0.42 lb/mmBtu and the Neal North unit at 1.26 lb/mmBtu. Nebraska Public Power District recently received a permit for low-NOx burners at their Gerald Gentleman Station with a limit of 0.50 lb/mmBtu. Two Detroit Edison units in the state of Michigan received CO limits equivalent to less than 0.3 lb/mmBtu. The only unit that is a cyclone boiler is the Neal North unit, which was permitted at 1.26 lb/mmBtu. The New Madrid unit's limit is well below the permitted cyclone unit in Iowa.

The main purpose for installing OFA controls is to minimize NOx emissions. Reductions in NOx emissions will be substantial, so great that for each permitted source, the permitting authority has deemed it appropriate to use the CO emissions limit proposed by the applicant, and presumably, based on engineering analysis completed by the company and its vendors.

Recent legislation has served to accomplish two things. No longer are pollution control projects exempted from BACT review should emissions of any pollutant exceed the significant threshold. Secondly, existing installations are being forced to drastically reduce NOx emissions from utility boilers. CO emissions are a result of incomplete combustion and are inversely related to NOx emissions. While installations are being forced to reduce NOx emissions, it remains in the installation's best interest financially to minimize CO emissions; electric generation per ton of coal combusted decreases with increasing CO emissions.

AECI – New Madrid Power Plant's cyclone boilers are being permitted at the lowest level of CO emissions for boilers of their type.

AECI's Response:

AECI is unaware of any effect that selective catalytic reduction (SCR) may have to CO emissions on large coal-fired utility boilers.

OFA is expected to reduce emissions of nitrogen oxides (NOx) and it is assumed there will be an increase of carbon monoxide (CO) emissions. Following discussions with the MDNR and our engineering consultants (Burns and McDonnell) AECI agreed to reduce the CO limitation from 0.70 lb/mmBtu (see permit application documents submitted June 2, 2006) to a CO emission limit of 0.55 lbs/mmBtu. Associated believes that the emission limit of 0.55 lb/mmBtu is appropriate for the following reasons:

(1) Boiler/Burner Type

The lower permit limits from other Region VII states that EPA cites (Kansas, Nebraska and Iowa) are for PC boilers with low-NOx burners (LNB) and/or OFA. Cyclone boilers are inherently less efficient at combusting coal than pulverized coal (PC) boilers. This inefficiency is recognized in the higher CO emission limit of 0.55 lb/mmBtu. In addition, the boiler was originally engineered for combustion of higher Btu bituminous coal and is smaller/shorter than ideal for burning subbituminous (low sulfur/lower Btu) PRB coal. The smaller boiler does not allow for sufficient residence time (at sufficient temperatures) to convert all CO to CO₂.

Comparison to Jeffrey Unit 3

With respect to the Jeffrey Unit 3 (Kansas), this unit is an 800 MW PC boiler. The combustion modifications at Jeffrey included the addition of low-NOx burners, separated overfire air (SOFA), and changes to coal pulverizers. The modification of the pulverizers will improve coal fineness and result in improved combustion and lower CO.

The New Madrid units are 600 MW (nominal) cyclone burners that will have overfire air only. New Madrid optimizes the hammermill (coal crushing) operation to the extent possible, but there is no such option to improve the fineness of the coal as with Jeffrey Unit 3. Further, as stated above, the smaller/shorter boiler does not allow for sufficient time and temperatures to convert all CO to CO₂.

(2) Safety and Financial Factors

Associated will maintain CO emissions as low as possible, regardless of the permit limit. In addition to environmental impacts, Associated is also mindful of the safety and financial issues involved with over production of carbon monoxide.

Safety - Elevated levels of carbon monoxide may present an explosive potential. Associated is mindful of our commitment to the safety of our people and property. New Madrid operations will work carefully to keep carbon monoxide emissions as low as practicable while achieving the greatest NO_x reduction possible. This will be achieved through tuning and monitoring of NO_x and CO in the flue gas stream. The certified NO_x and new CO analyzers will be used to monitor and operate the OFA system.

Financial - CO emissions are the result of incomplete combustion. Failure to completely combust coal in the boiler means that Associated is not taking full advantage of the thermal potential of the fuel. In short, CO emissions equal dollars lost to Associated.

(3) Uncertainty

In contrast to back-end control equipment, OFA is a process, not a piece of equipment with vendor guarantees. The CO and NO_x emissions will vary to different degrees depending on ambient conditions, coal grade, and even operator preference. As stated above, Associated will work to tune the process (to the extent possible) and aggressively reduce NO_x emissions while maintaining acceptable levels of CO concentration (see safety and financial discussion above).

Neither Associated nor the DNR possess data to indicate what CO emissions are at present for the New Madrid units. Annual emission totals for the EIQ are based on (potentially non-representative) AP-42 emission rates. It is in neither the best interest of the agency nor that of AECI to permit a project at an emission rate that is not achievable. Further, to constrain CO emissions to levels that would hinder NO_x reductions will only serve to increase the tons of NO_x emitted to the air.

(4) Environmental Impact

The application, as sent to the DNR on June 2, 2006, included all appropriate information and analysis to demonstrate that the OFA projects will not result in a negative impact to the environment. In fact, the SCREEN3 modeling and calculations were based on the more conservative emission rate of 0.70 lb/mmBtu. Sections 6.2/6.6 state:

(Section 6.2) "The modeling shows that CO emissions are not expected to exceed its Modeling Significance Levels at either 70 percent or 100 percent load (*implied – ER = 0.70 #/mmBtu*). According to the Draft EPA New Source Review Workshop Manual, if modeled impacts do not exceed the Modeling Significance Levels, an SIA and a NAAQS modeling analysis is not needed."

(Section 6.6) As shown in Table 6-6, the modeling analysis predicts that there are no exceedances of the Modeling Significance Levels for CO. The installation of OFA at New Madrid's Unit 1 and Unit 2 are not expected to cause or contribute to a modeled exceedance of the NAAQS for CO.

The conclusions stated above are predicated on conservative estimates and according to EPA approved defaults. BACT should therefore be considered "Good Combustion Practices" with an accompanying emission rate limit of 0.55 lb/mmBtu on a 30-day rolling average.

Comment: Use of CEMS and Enhanced Enforceability

"We commend the department's use of CO continuous emission monitors for verification that the CO BACT limits is being met during all periods of operation. We encourage you to build on the requirements in Condition 2 by requiring the CO CEMS to be certified pursuant to 40 CFR Part 60, Appendix B, Performance Specification 4. This assures that the monitor at least meets minimum EPA specifications.

The department may also want to enhance the quality of monitoring data by requiring periodic quality assurance assessments using procedures similar to those in 40 CFR Part 60, Appendix F. Even if the CO Continuous Emission Monitoring System (CEMS) does not undergo annual relative accuracy testing, it could benefit from periodic cylinder gas audits to assure that the measurements can be tied to by National Institute of Standards and Technology-certified calibration gases.

Lastly, while AECl is required to keep records of CEMS data in Condition 2.B, the permit does not appear to require the utility to report periodically on its CO BACT compliance status. Given the uncertainty and wide range of CO BACT emissions limits across the region, it would be beneficial to have AECl provide a CO emissions report for some period of time following the retrofit. For example, it might help inform other CO BACT analyses performed for NOx retrofits occurring under the Clean Air Implementation Rule program. If the data ultimately show that the CO BACT limit is being met with an adequate margin of safety, then it may be appropriate to go to "excess emission" reporting at some point in the future.

In any case, we encourage the department to add some level of reporting so that there is adequate information available to verify compliance without visiting the plant on site."

MDNR's Response:

The Department concurs with EPA's comment. Special conditions have been revised to incorporate CEMS certification, quality assurance practices and reporting.

AECl's Response:

AECl agrees with this comment. AECl intends to adhere to a quality assurance plan that meets the requirements of PS4/4A. The certification program will include daily calibrations, cylinder gas audits (CGA), and RATA testing. RATA testing for Unit 2 will be performed on a schedule amenable to the plant and to our test vendor. This will likely be scheduled with the mobilization for RATA testing at Chamois Power Plant during the fourth quarter of 2006. RATA testing for Unit 1 will be performed in the third quarter of 2007 along with the regularly scheduled tests for the Acid Rain certified CEMS at New Madrid.

AECl will report to the DNR every six months in the semi-annually monitoring (SAM) report and in the annual compliance certification (ACC). Should the DNR request more frequent compliance reporting (e.g. quarterly), AECl will act in accordance with the request.

Mr. Todd Tolbert
Environmental Specialist
Associated Electric Cooperative, Inc.
P.O. Box 754
Springfield, MO 65801-0754

RE: New Source Review Permit - Project Number: 2006-06-026

Dear Mr. Tolbert:

Enclosed with this letter is your permit to construct. Please study it carefully. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files.

Operation in accordance with these conditions, your new source review permit application and with your revised operating permit is necessary for continued compliance.

The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you have any questions regarding this permit, please do not hesitate to contact me at (573) 751-4817, or you may write to me at the Department of Natural Resources', Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102.

Thank you,

AIR POLLUTION CONTROL PROGRAM

Kendall B. Hale
New Source Review Unit Chief

KBH:lkI

Enclosures

c: Southeast Regional Office
PAMS File 2006-06-026